PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference PU030165	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2004/020028	International filing date *(day/month/year)* 23 June 2004 (23.06.2004)	Priority date *(day/month/year)* 25 June 2003 (25.06.2003)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant THOMSON LICENSING S.A.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 15 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☒	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☒	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 03 January 2006 (03.01.2006)
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Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

REC'D 12 JAN 2005
WIPO PCT

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)* see form PCT/ISA/210 (second sheet)	
Applicant's or agent's file reference see form PCT/ISA/220	**FOR FURTHER ACTION** See paragraph 2 below
International application No. PCT/US2004/020028	International filing date *(day/month/year)* 23.06.2004
Priority date *(day/month/year)* 25.06.2003	
International Patent Classification (IPC) or both national classification and IPC H04N7/50, G06T9/00	
Applicant THOMSON LICENSING S.A.	

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☒ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

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Form (PCT/ISA/237) (Cover Sheet) (January 2004)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2004/020028

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

   ☐ a sequence listing

   ☐ table(s) related to the sequence listing

   b. format of material:

   ☐ in written format

   ☐ in computer readable form

   c. time of filing/furnishing:

   ☐ contained in the international application as filed.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

Box No. II Priority

1. ☒ The following document has not been furnished:

   ☒ copy of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(a)).

   ☐ translation of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(b)).

   Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43*bis*.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.

3. ☐ It has not been possible to consider the validity of the priority claim because a copy of the priority document was not available to the ISA at the time that the search was conducted (Rule 17.1). This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

4. Additional observations, if necessary:

   see separate sheet

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	6-13,15,17-24,
	No:	Claims	1-5,14,16,25-28
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-28
Industrial applicability (IA)	Yes:	Claims	1-28
	No:	Claims	

2. Citations and explanations

   see separate sheet

Box No. VI Certain documents cited

1. Certain published documents (Rules 43*bis*.1 and 70.10)

   and / or

2. Non-written disclosures (Rules 43*bis*.1 and 70.9)

   see form 210

Re Item II
Priority

1. The application US 60/430793 filed 04.12.2002 discloses a video encoder (200, 300) for encoding video signal data of a current picture in association with at least one reference picture, the encoder comprising a reference picture weighting applicator (292, 392) and a reference picture weighting factor unit (272, 372) responsive to a frame difference (page 16 lines 3-27; page 17 lines 7-15; page 17 line 31 - page 18 line 10) and in signal communication with the reference picture weighting applicator (fig. 2, 3; page 7 lines 8-10; page 8 lines 23-25) for assigning a weighting factor corresponding to the at least one reference picture (page 17 line 31 - page 18 line 2).

   US 60/430793 filed 04.12.2002 served as a basis for claiming right of priority for the international application PCT/US2003/036413 of the same applicant as the present application.

   Thus the application USP 482301 filed 25.06.2003 is not the first application of the applicant for the subject-matter of claim 1. Therefore the claimed priority from USP 482301 filed 25.06.2003 is not valid for independent claim 1 (Article 8 PCT, Article 4C of the Stockholm Act of Paris Convention).

2. The application US 60/430793 filed 04.12.2002 also discloses a method for encoding video signal, comprising the steps of receiving uncompressed image block (fig. 2, 3); assigning a weighting factor for the image block corresponding to a particular reference picture having a corresponding index (page 14 lines 30-32; page 15 lines 15-25), using frame differences to determine the weighting factor (page 16 lines 6-16; page 17 lines 7-15; page 17 line 31 - page 18 line 10); computing motion vectors corresponding to the difference between the image block and the particular reference picture (280, 380; page 15 line 26 - page 16 line 4); motion compensating the particular reference picture in correspondence with the motion vectors (290, 390; page 16 lines 5-16); adjusting the motion compensated reference picture by the assigned weighting factor to form a weighted motion compensated reference picture (292, 392; page 7 lines 8-10; page 8 lines 23-25); subtracting the weighted motion compensated reference picture from the substantially uncompressed image block

(210, 310); and encoding a signal indicative of the difference between the substantially uncompressed image block and the weighted motion compensated reference picture along with the corresponding index of the particular reference picture (fig. 2, 3; page 14 lines 30-32).

Since US 60/430793 filed 04.12.2002 served as a basis for claiming right of priority for the international application PCT/US2003/036413 of the same applicant as the present application, the application USP 482301 filed 25.06.2003 is not the first application of the applicant for the subject-matter of claim 16.

Therefore the claimed priority from USP 482301 filed 25.06.2003 is also not valid for independent claim 16 (Article 8 PCT, Article 4C of the Stockholm Act of Paris Convention).

3. The application US 60/430793 filed 04.12.2002 also discloses the subject-matter of dependent claim 2 that the reference picture weighting factor unit is responsive to a motion compensated frame difference (page 16 lines 6-16; page 17 lines 7-10).

The additional feature of dependent claim 4 (weighting factor unit being responsive to a plurality of reference pictures) is also disclosed by the application US 60/430793 filed 04.12.2002 (page 17 line 31 - page 18 line 10).

The additional feature of dependent claim 5 (reference picture weighting factor unit being responsive to weighting factors iteratively derived from the motion compensated frame difference) is also disclosed by the application US 60/430793 filed 04.12.2002 (page 16 lines 17-27).

The subject-matter of: dependent claim 9 (motion compensation unit providing at least one of a motion compensated fade-out start and fade-in end picture); dependent claim 10 (storing each of fade-out start and fade-in end pictures); dependent claim 11 (applying weighting factors selected to motion compensated fade-out start and fade-in end pictures); dependent claim 12 (encoder being usable with bi-predictive picture predictors forming the predictors from weighted motion compensated fade-out start and fade-in end pictures); dependent claim 13 (fade-out

start and fade-in end pictures being from opposite directions) is also known from the disclosure of the application US 60/430793 filed 04.12.2002 (fig. 2 (270, 290), 3 (370, 390), fig. 10; page 1 lines 25-28; page 3 line 27 - page 4 line 2; page 18 line 11 - page 19 line 14).

The additional feature of dependent claim 14 (motion estimation unit being in signal communication with the reference picture weighting factor unit for providing motion estimation responsive to a weighting factor) is also disclosed by the application US 60/430793 filed 04.12.2002 (fig. 2; page 6 lines 30-32).

The application US 60/430793 filed 04.12.2002 (page 18 line 21 - page 19 line 14) also discloses the additional feature of dependent claim 26 (bi-predictive picture references being used, and a second weighting factor corresponding to a second reference picture being applied to the motion compensated second reference picture and encoding a signal indicative of the difference between the uncompressed image block and the weighted motion compensated second reference picture along with the index of the second reference picture)

The subject-matter of dependent claims 25 and 28 (motion vectors being computed by testing within a search region every possible displacement within a predetermined range of offsets, calculating the sum of absolute differences or mean square error of each pixel in the image block with a motion compensated reference picture and selecting the offset with the lowest sum of absolute difference or mean square error) is also disclosed by the application US 60/430793 filed 04.12.2002 (page 15 lines 3-14).

Therefore the present application does not validly claim priority from USP 482301 filed 25.06.2003 for claims 2, 4, 5, 9-14, 25, 26, 28 (Article 8 PCT, Article 4C of the Stockholm Act of Paris Convention).

4. It is also pointed out that the subject-matter of independent claims 1 and 16, and the subject-matter of dependent claims 2, 4, 5, 14, and 25-28 is disclosed by the application US 10/410479 filed 09.04.2003, which served as a basis for claiming a right of priority for the international application PCT/US2003021653 (for reasons see

below, the disclosure of US 10/410479 corresponds to the disclosure of Document D2).

Thus the application USP 482301 filed 25.06.2003 is not the first application of the applicant for the subject-matter of said claims. Therefore the claimed priority from USP 482301 filed 25.06.2003 is not valid for claims 1, 2, 4, 5, 14, 16, and 25-28 (Article 8 PCT, Article 4C of the Stockholm Act of Paris Convention).

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following documents:
   - D1: WO 2004/054225 A (THOMSON LICENSING SA ; BOYCE JILL MACDONALD (US)) 24 June 2004 (2004-06-24)
   - D2: WO 2004/008642 A (THOMSON LICENSING SA ; STEIN ALAN JAY (US); BOYCE JILL MACDONALD (US)) 22 January 2004 (2004-01-22)
   - D3: EP-A-0 511 778 (AMERICAN TELEPHONE & TELEGRAPH) 4 November 1992 (1992-11-04)
   - D4: PATENT ABSTRACTS OF JAPAN vol. 2000, no. 07, 29 September 2000 (2000-09-29) & JP 2000 106675 A (MATSUSHITA ELECTRIC IND CO LTD), 11 April 2000 (2000-04-11)
   - D5: YONEYAMA A ET AL: "FAST DISSOLVE OPERATIONS FOR MPEG VIDEO CONTENTS" PROCEEDINGS 2000 INTERNATIONAL CONFERENCE ON IMAGE PROCESSING. ICIP 2000. VANCOUVER, CANADA, SEPT. 10 - 13, 2000, INTERNATIONAL CONFERENCE ON IMAGE PROCESSING, NEW YORK, NY : IEEE, US, vol. VOL. 2 OF 3. CONF. 7, 10 September 2000 (2000-09-10), pages 291-294, XP001129014 ISBN: 0-7803-6298-5

2. The application does not meet the requirements of Article 6 PCT, because claims 1, 9, 24, 25, and 28 are not clear.

2.1. The independent claim 1 reads that the video encoder comprises a reference picture weighting factor applicator, but it is not clear from the wording of the claim where the weighting factors are applied to, whether on reference pictures themselves, or on the resulting frames of motion compensation or on the error signals formed by taking difference between the current picture and the reference pictures. As it is understood from the disclosure of the application, an essential feature of the invention lies on the motion compensated pictures being multiplied with weighting factors (fig 2, 3, 5, 6 (622), 7 (720); description page 4 lines 19-22; page 8 lines 17-26; page 9 lines 22-25; page 10 lines 23-28; page 11 lines 15-20; page 12 lines 1-4).Since independent claim 1 does not contain this feature it does not meet the requirement following from Article 6 PCT taken in combination with Rule 6.3(b) PCT that any independent claim must contain all the technical features essential to the definition of the invention.

2.2. The additional feature of dependent claim 9 that the motion compensation unit being suitable for providing at least one of a motion compensated fade-out start or fade-in end picture responsive to the reference weighting factor unit does not further define the claimed encoder apparatus. The intended limitations are therefore not clear from this claim, contrary to the requirements of Article 6 PCT.

2.3. The subject-matter of dependent claim 24 is not clear because what is meant by "both sides" used in the expression "taking an expectation on both sides" can not be understood from the wording of the claim.

2.4. The features of claims 25 and 28 that testing every displacement within a predetermined search region, calculating at least one of the sum of the absolute difference and the mean squared error of pixels in the image block with a motion compensated reference picture, are not referred to in the description. Claims 25 and 28 are therefore not supported by the description as required by Article 6 PCT.

3. Furthermore, the above-mentioned lack of clarity notwithstanding, the subject-matter of claim 1-5, 14, 16, and 25-28 is not new in the sense of Article 33(2) PCT, and therefore the criteria of Article 33(1) PCT are not met.

3.1. .The subject matter of independent claim 1 is not new over the disclosure of D2 in the

sense of Article 33(2) PCT. D2 describes an encoder comprising a reference picture weighting applicator (292, 392) and a reference picture weighting factor unit (272, 372) responsive to a frame difference in signal communication with weighting applicator for assigning a weighting factor corresponding to at least one reference picture (fig. 6; page 2 lines 8-32; page 8 line 32- page 9 line 4; page 10 line 25 - page 11 line 6; page 15 line 15 - page 16 line 25).

3.2. The subject matter of independent claim 16 is not new over the disclosure of D2 in the sense of Article 33(2) PCT. D2 describes an encoding method where a reference picture weighting factor unit assigns a weighting factor for the image block corresponding to a particular reference picture (abs.; fig. 2, 3; page 2 lines 8-32). A weighting factor is determined using frame differences (fig. 6; page 2 lines 8-32; page 8 line 32- page 9 line 4; page 10 line 25 - page 11 line 6; page 15 line 15 - page 16 line 25). The motion compensated reference picture is adjusted by the assigned weighting factor to form a weighted motion compensated reference picture (fig. 2, 3).

3.3. For the sake of completeness, it is pointed out that the subject-matter of independent claim 1 is also not novel over the disclosure of D3 in the sense of Article 33(2) PCT. The document D3 discloses (the references in parentheses applying to this document): a video encoder (fig.1) for encoding video signal data of a current picture in association with at least one reference picture (claim 1), the encoder comprising a reference picture weighting applicator (129; page 5 lines 31-41) and a reference picture weighting factor unit (118; page 5 lines 28-31) responsive to a frame difference (claim 1; abs.; fig. 10; page 6 line 19 - page 8 line 11) and in signal communication with the reference picture weighting applicator for assigning a weighting factor (fig. 1; page 5 lines 28-41) corresponding to the at least one reference picture (claim 1; abs.; page 7 lines 5-6).

3.4. The subject-matter of independent claim 16 is also not new over the disclosure of D3 in the sense of Article 33(2) PCT. D3 discloses a method for encoding video signal, comprising the steps of receiving uncompressed image block (claim 1; fig. 1; page 3 lines 19-40); assigning a weighting factor for the image block corresponding to a particular reference picture having a corresponding index (page 5 lines 21-31), using frame differences to determine the weighting factor (claim 1; abs.; fig. 10; page 6 line

19 - page 8 line 11); computing motion vectors corresponding to the difference between the image block and the particular reference picture (page 5 lines 21-26); motion compensating the particular reference picture in correspondence with the motion vectors (page 4 lines 38-46); adjusting the motion compensated reference picture by the assigned weighting factor to form a weighted motion compensated reference picture (page 4 line 54 - page 5 line 5; page 5 lines 31-39); subtracting the weighted motion compensated reference picture from the substantially uncompressed image block (page 5 lines 39-41); and encoding a signal indicative of the difference between the substantially uncompressed image block and the weighted motion compensated reference picture along with the corresponding index of the particular reference picture (page 5 lines 41-47; page 7 lines 5-6).

3.5. The subject-matter of dependent claims 2, 4, 5, 14, and 25-28 is not new over the disclosure of D2 in the sense of Article 33(2) PCT.

D2 discloses the subject-matter of dependent claim 2 that the reference picture weighting factor unit is responsive to a motion compensated frame difference (page 10 line 23 - page 11 line 6; page 15 lines 15-25). The additional feature of dependent claim 4 (weighting factor unit being responsive to a plurality of reference pictures) is also disclosed by the application D2 (page 17 lines 7-19). The subject-matter of dependent claim 5 (reference picture weighting factor unit being responsive to weighting factors iteratively derived from the motion compensated frame difference) is also known from D2 (fig. 6; page 15 line 26 - page 17 line 27). D2 (fig. 2, 3; page 14 lines 24-27; page 15 line 14 - page 16 line 2) also discloses the additional feature of dependent claim 14 (motion estimation unit being in signal communication with the reference picture weighting factor unit for providing motion estimation responsive to a weighting factor).

The subject-matter of dependent claim 26 (bi-predictive picture references being used, and a second weighting factor corresponding to a second reference picture being applied to the motion compensated second reference picture and encoding a sinal indicative of the difference between the uncompressed image block and the weighted motion compensated second reference picture along with the index of the second reference picture) is disclosed by D2 (claims 8, 13, 14; page 12 lines 25-27;

page 13 lines 26-27; page 17 lines 17-19). The additional feature of dependent claim 27 (two different reference frames being from the same direction relative to the image block) is also known from the disclosure of D2 (claims 9, 15).

The subject-matter of dependent claims 25 and 28 (motion vectors being computed by testing within a search region every possible displacement within a predetermined range of offsets, calculating the sum of absolute differences or mean square error of each pixel in the image block with a motion compensated reference picture and selecting the offset with the lowest sum of absolute difference or mean square error) is also disclosed by D2 (claims 12, 16).

3.6. For the sake of completeness, it is pointed out that the subject-matter of dependent claims 2-5, 14, 25, 26, and 28 is also not new over the disclosure of D3 in the sense of Article 33(2) PCT.

The subject-matter of: dependent claim 2 (weighting factor unit being responsive to motion compensated frame difference) is also disclosed by D3 (page 6 line 45 - page 7 line 6); dependent claim 3 (frame difference being calculated between the current and the reference picture) is known from the disclosure of D3 (page 2 lines 15-30); dependent claim 4 (weighting factor unit being responsive to a plurality of reference pictures) is not new over D3 (page 5 lines 36-39); dependent claim 5 (factors being derived iteratively) is also known from the disclosure of D3 (fig. 6; page 10 lines 8-34); dependent claim 14 (motion estimation being responsive to weighting factors) is also disclosed by D3 (page 5 line 21-31) since the motion vectors and the weights corresponding to the reference frames pointed by the motion vectors are determined together trying to minimize the frame difference between the motion compensated picture and the current picture, therefore motion estimation is also responsive to the weighting factors. The subject-matter of: dependent claim 26 (bi-directive predictive picture predictors being used) is not new over D3 (page 6 line 40 - page 7 line 6); dependent claims 25 and 28 (testing every displacement within a search region and calculating the mean squared error of each pixel in the image block with a motion compensated reference picture) is also known from the disclosure of D3 (claim 1; page 6 line 19 - page 7 line 6).

4. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 6-8, 9-13, 15, and 17-24 does not involve an inventive step in the sense of Article 33(3) PCT.

4.1. The features of dependent claims 9-13 (motion compensation unit providing at least one of a motion compensated fade-out start and fade-in end picture); dependent claim 10 (storing each of fade-out start and fade-in end pictures); dependent claim 11 (applying weighting factors selected to motion compensated fade-out start and fade-in end pictures); dependent claim 12 (encoder being usable with bi-predictive picture predictors forming the predictors from weighted motion compensated fade-out start and fade-in end pictures); dependent claim 13 (fade-out start and fade-in end pictures being from opposite directions) are not disclosed by document D3, which is regarded as being the closest prior art document.

The objective technical problem solved by the distinguishing features of the invention can therefore be stated as how to adapt the weighted motion compensated encoder for also coding fade-in fade-out sequences.

The prior art document D4 discusses the problems of implementing motion compensation for coding video data having fading effects (having fade-in fade-out pictures) and tries to eliminate the effects of fading so that an efficient motion compensation can be implemented (abs; fig. 2, 18, 19; par. 0018-0022, 0027). The encoder disclosed therein also comprises picture stores and is usable with bi-predictive picture predictors (fig. 2; par. 0094). The teachings of D4 also states that weighted prediction can be used (par. 0127, 0164).

It would be obvious to the person skilled in the art, namely when the same result is to be achieved, to apply these features with corresponding effect to an encoder according to document D3, thereby arriving at an encoder according to claims 9 to 13. Thus the subject-matter of claims 9 to 13 does not involve an inventive step over the combined teachings of D3 and D4 in the sense of Article 33(3) PCT.

4.2. The additional features of dependent claims 8 and 23 (weighting factor unit also applying a weighting offset derived as the average difference between the current

picture and a weighted motion compensated reference picture) are also disclosed by D4. The encoder described in D4 first calculates the average AC values of the pixels of the target and reference frames, then computes the differences between the average value of the target frame and the reference frames and further inputs them to the motion estimation unit. In the motion estimation unit the provided difference values are deducted from the pixel values within the target block to eliminate the effects of fading (par. fig. 3; par. 0106-0113). So the values denoted by De1m are offset values derived as the average difference between the current and reference pictures. Therefore the subject-matter of claims 8 and 23 does not involve an inventive step over the combined teachings of D3 and D4 in the sense of Article 33 (3) PCT.

4.3. The additional features of: dependent claim 15 (summing the weighted motion compensated reference picture with the offset); dependent claim 24 (deriving the weighting offset as the average difference between the current picture and the weighted motion compensated reference picture) are also disclosed by D4 (fig. 3; par. 0107, 0108, 0110, 0112). Therefore, the subject-matter of claims 15 and 24 do not involve an inventive step in the sense of Article 33(3) PCT.

4.4. The additional features of dependent claims 6, 7, 17, 18, 19 that linear regression or statistical methods such as curve fitting or expectation calculation are not disclosed by D3, however they are well-known techniques employed to find a relation between a plurality of data values. It is also well-known to apply scaling to frames forming dissolving sequences (forming fade-in fade-out frames), see D5 (abs.; section 2) for example. The person skilled in the art faced with the problem of assigning weights to dissolving shots would try to find out the contribution of different shots in a frame, therefore he would try to establish the correlation between the frames. Thus implementing the above stated linear regression or statistical methods in reference picture weighting factor assignment problem is not found to involve an inventive step over the combined teachings of D3 and D5.

4.5. The additional feature of dependent claim 21 (method comprising iterating weighting factor to take the motion into consideration) is known from the disclosure of D3 (page 10 lines 8-34).

The additional feature of dependent claim 22 (iterating process comprising calculating the motion vectors between the current picture and weighted reference picture and computing the weighting factor using the motion compensated difference) is not found to involve an inventive step over the disclosure of D3 in the sense of Article 33(3) PCT. The method described in D3 finds a motion vector corresponding to a reference frame, then by fixing this motion vector calculates the energy of the error signal, that is the difference between the current frame and a weighted motion compensated reference frame, and trying to minimize this energy value searches for a motion vector for the other reference frame. This process is iteratively repeated until the difference between the current frame and the weighted compensation frame drops below a threshold.

The additional feature of dependent claim 20 (employing subsampling to save computations) is a well-known design matter for the person skilled in image processing. Therefore claim 20 is not found to involve an inventive step in the sense of Article 33 (3) PCT.

Re Item VI
Certain documents cited

Certain published documents

Application No Patent No	Publication date *(day/month/year)*	Filing date *(day/month/year)*	Priority date *(valid claim)* *(day/month/year)*
WO2004054225	24 June 2004	13.11.2003	04.12.2002